REMARKS/ARGUMENTS

Applicants' Present Claims

The present claims are directed to a high tensile cold-rolled steel sheet consisting essentially of 0.04 to 0.13% C, 0.3 to 1.2% Si, 1.0 to 3.5% Mn, 0.04% or less P, 0.01% or less S, 0.021 to 0.07% Al, 0.004% or less N, 0.2% or less Cr, by mass, and a balance of Fe and inevitable impurities; having a microstructure containing 50% or larger area percentage of ferrite and 10% or larger area percentage of martensite, and having a ratio of intervals of the martensite in the rolling direction to those in the sheet thickness direction of 0.85 to 1.5; and having a nano strength of the martensite of 8 GPa or larger (see applicants' present claim 1).

The present claims also pertain to a method for manufacturing a high tensile cold-rolled steel sheet, comprising the steps of: hot-rolling a steel slab consisting essentially of 0.04 to 0.13% C, 0.3 to 1.2% Si, 1.0 to 3.5% Mn, 0.04% or less P, 0.01% or less S, 0.021 to 0.07% Al, 0.004% or less N, 0.2% or less Cr, by mass, and a balance of Fe and inevitable impurities, into a steel sheet, followed by coiling at a coiling temperature

ranging from 450°C to 650°C; cold-rolling the coiled steel sheet at a cold-rolling reduction ranging from 30 to 70%; annealing the cold-rolled steel sheet by heating to a temperature range of [the coiling temperature + the cold-rolling reduction percentage x 4.5] to [the coiling temperature + the cold-rolling reduction percentage x 5.5] (°C); and cooling the annealed steel sheet to a temperature of 340°C or below at an average cooling rate of 10°C/s or higher, thereby manufacturing a high tensile cold-rolled steel sheet having a microstructure containing 50% or larger area percentage of ferrite and 10% or larger area percentage of martensite, and having a ratio of intervals of the martensite in the rolling direction to those in the sheet thickness direction of 0.85 to 1.5; and having a nano strength of the martensite of 8 GPa or larger (see applicants' present claim 5).

The steel sheets provided by applicants' present claims are desirably used as reinforcing members of pillars and dashboards of automobiles.

Obviousness Rejections Under 35 USC 103

Claims 1 to 8 were rejected under 35 USC 103 as being unpatentable over US 2003/0047256 (to Kami) for the reasons set forth in item no. 5 on pages 2 to 8 of the Office Action of April 4, 2011.

It was admitted in the Office Action of April 2, 2011 that US 2003/0047256 differs from applicants' claims 1 and 5 because it does not specifically teach the ratio of intervals of the martensite in the rolling direction to those in the sheet thickness direction or the nano strength of the martensite.

It was also admitted in the Office Action of April 4, 2011 that the compositional ranges of Al and N in the steel of US 2003/0047256 do not overlap with the ranges of Al and N in applicants' instant claims.

It was further admitted in the Office Action of April 4, 2011 that US 2003/0047256 does not teach the formula of the annealing temperature range recited in applicants' claim 5.

As discussed above, US 2003/0047256 does not teach the following important constituent feature of the presently claimed invention: "having a ratio of intervals of the martensite in the

rolling direction to those in the sheet thickness direction of 0.85 to 1.5." This feature is depicted in applicants' Fig. 1.

Applicants have prepared the following Figure 2 and Figure 3 to assist the Examiner in her understanding of the aforesaid important constituent feature. The data for Figure 2 and Figure 3 were taken exclusively from Table 3-1 on page 27 of the specification and Table 3-2 on page 28 of the specification.

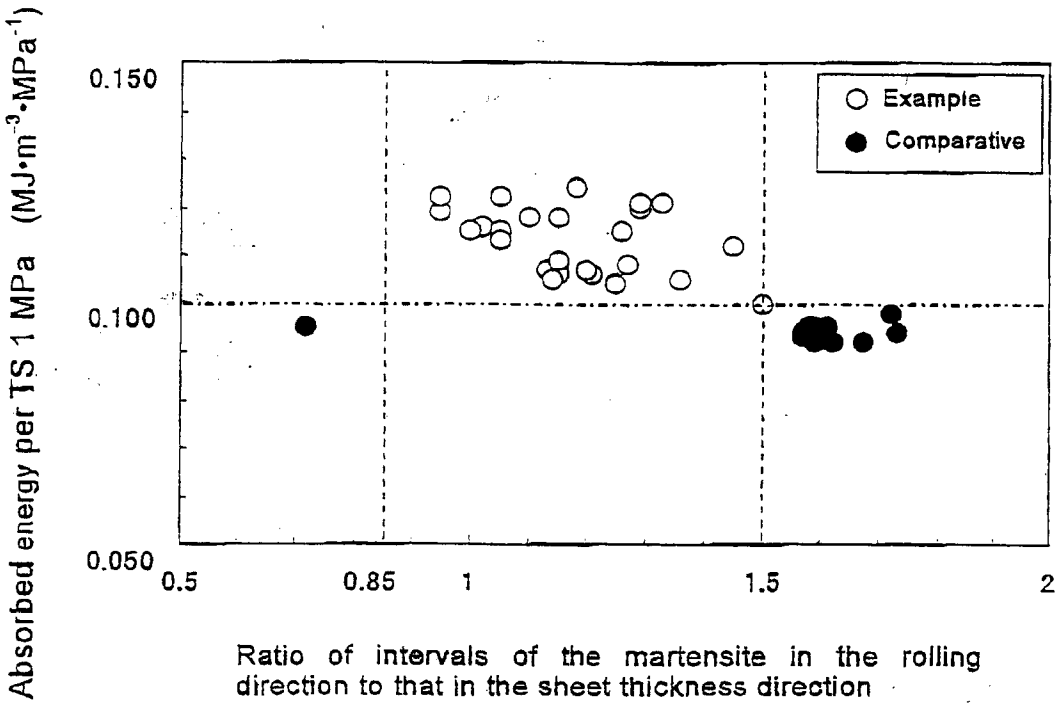

Figure 2 Effect of Ratio of intervals to Absorbed energy

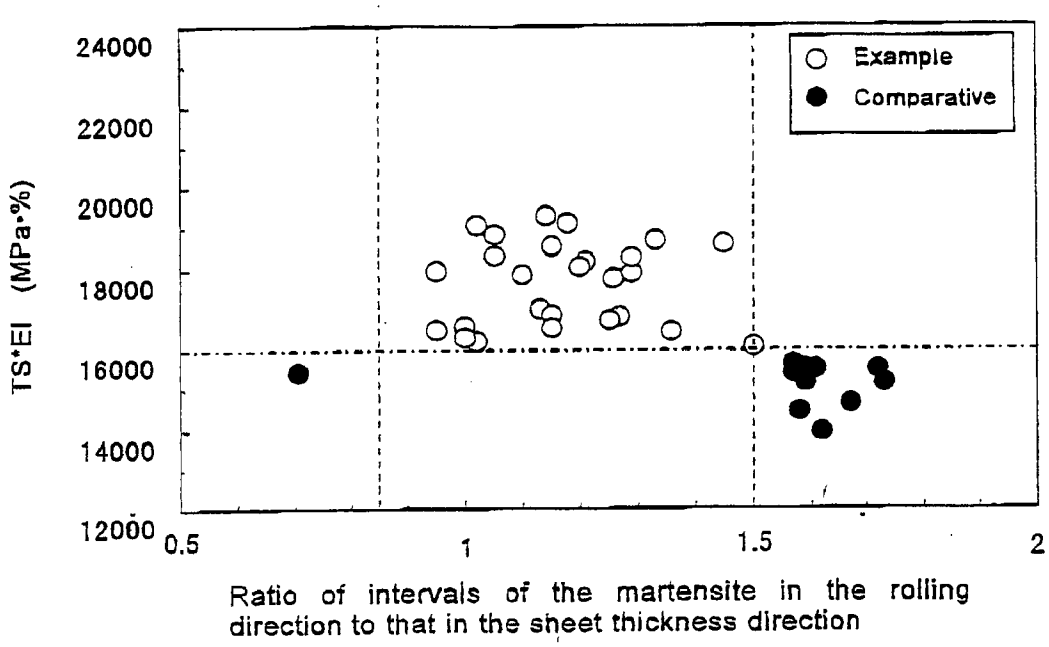

Figure 3 Effect of Ratio of intervals to TS*El

As shown in Figure 2, excellent values for high absorbed energy is achieved only when the ratio of intervals of the martensite in the rolling direction to those in the sheet thickness direction is 0.85 to 1.5.

As shown in Figure 3, excellent high values for TS•E1 are achieved only when the ratio of intervals of the martensite in the rolling direction to those in the sheet direction is 0.85 to 1.5.

To attain the feature of the ratio of intervals of the martensite in the rolling direction to those in the sheet direction being 0.85 to 1.5, it is indispensable to employ a very severe control of the annealing temperature. The following Figure 4 shows the relationship of the annealing temperature and the cooling temperature in the presently claimed invention.

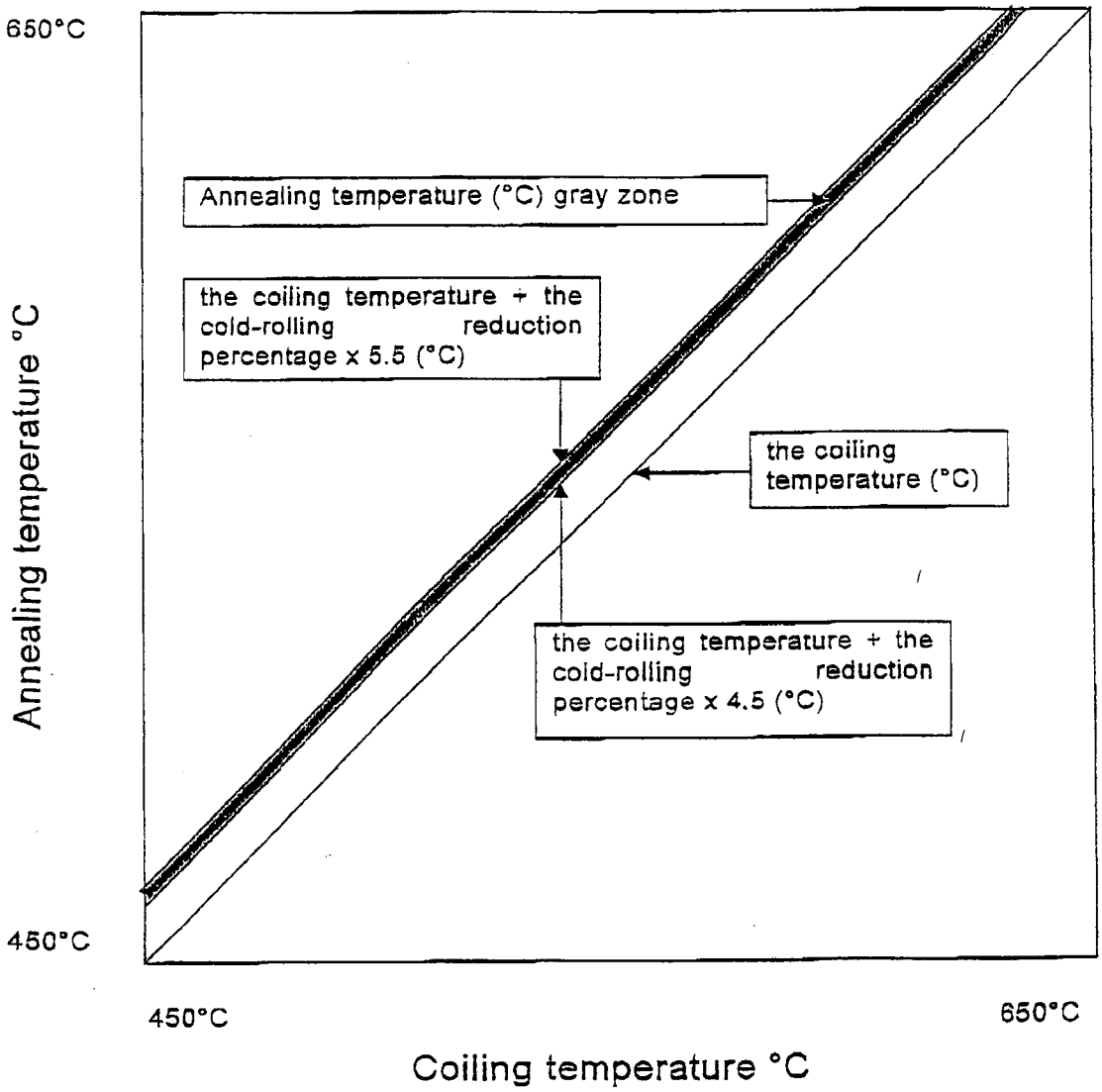

Figure 4 Annealing temperature of present invention (gray zone)

Paragraphs [0147] to [0149] of US 2003/0047256 teach that the annealing temperature is between 700 to 900°C. This is far higher than the range shown in the above Figure 4.

Withdrawal of the 35 USC 103 rejection over US 2003/0047256 is therefore respectfully requested.

Claims 1 to 8 were rejected under 35 USC 103 as being unpatentable over USP 6,319,338 (Kawano et al.) for the reasons set forth in item no. 6 beginning at the bottom of page 6 and continuing to the top of page 11 of the Office Action of April 4, 2011.

It was admitted in the Office Action of April 4, 2011 that USP 6,319,338 does not teach a separate compositional range for each of Al and N.

It was further admitted in the Office Action of April 4, 2011 that USP 6,319,338 does not teach the ratio of intervals of martensite in the rolling direction to those in the sheet thickness direction or the nano strength of the martensite as recited in applicants' claims.

It was additionally admitted in the April 4, 2011 Office Action that USP 6,319,338 does not teach the formula of the annealing temperature range as recited in applicants' claim 5.

In column 2, lines 19 to 21, USP 6,319,338 teaches a microstructure of a mixture of ferrite and/or bainite, either of which is the dominant phase, and a third phase including retained austenite at a volume fraction between 3% and 50%.

USP 6,319,338 teaches a typical "TRIP" steel. "TRIP" stands for "transformation induced plasticity." "TRIP" steel has a triple phase microstructure consisting of ferrite, bainite and retained austenite. "TRIP" steel does not contain martensite. The steel of the presently claimed invention is a "Dual Phase" steel consisting essentially of mainly a ferrite phase and a martensite phase. "TRIP" steel and "Dual Phase" steel are substantially different types of steel.

In view of the above, withdrawal of the 35 USC 103 rejection over USP 6,319,338 is respectfully requested.

In summary, it is respectfully submitted that one of ordinary skill in the art would not arrive at the presently claimed invention or the advantageous results afforded by the presently claimed invention based on the disclosures of US 2003/0047256 or the disclosure of USP 6,319,338.

Reconsideration and allowance of the above-identified application are respectfully solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,

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